

ROUGH DRAFT #2
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MOISTURE CONTENT OF CURED CHEATGRASS

by

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Forest and range fires usually start and spread in fine fuels. Flammability of these fuels is primarily dependent upon their moisture content. Consequently, accurate estimates of the moisture content of fine fuels is essential to effective fire control management.

Vegetable fibers have, in some instances, been used as humidity sensing elements in hygrographs because their response is rapid and consistent. One might expect fine forest and range fuels to behave in a similar manner. If so, the moisture content of fine fuels ought to be predictable.

Cheatgrass (Bromus tectorum) is a fire hazard over extensive areas of the Intermountain West. During the summer of 1960 moisture measurements were made in stands of cured cheatgrass near the Boise Basin Experimental Forest in central Idaho. The study area was located at the old abandoned Holcomb Guard Station which lies several miles to the west of Mores Creek. Plots were in the open on a gentle southwest-facing slope.

Small plots of cheatgrass were clipped even with the surface of the ground, placed into airtight tin cans, and later oven-dried. Clippings were made beginning June 23 and continued through September 10. The standard times for clippings were 8:00 a.m., 11:00 a.m., and 2:00 p.m. Supplemental readings were made occasionally at 6:30 a.m., 9:30 a.m., 12:30 p.m., 3:30 p.m., and 5:00 p.m. All oven-drying was accomplished at 103°C. in a gravity-type oven. Oven-drying was completed each day following all of the sampling and the results were tabulated and retained until the end of the season.

Weather measurements were made near the surface of the ground and at the standard 4-1/2-foot height. Temperature and humidity measurements were made within standard cotton region shelters. Windspeed was measured with an anemometer at the standard 20-foot height. At the end of the season all of the moisture content determinations were compiled by temperature, humidity, and windspeed classes.

Whenever the moisture content of cheatgrass exceeded fiber saturation (approximately 30 percent), large variations occurred. Following a rain shower or heavy dew, moisture content reached as high as 375 percent of oven-dry weight. Several samples taken at the same time would be much different. Below fiber saturation results were reasonably consistent.

Since high air temperature is normally a prerequisite for a serious fire situation, the analysis was confined to data above 60°F. All data for temperatures of 60°F. or greater, except following rain, were lumped and plotted by humidity classes of 5-percent intervals. Air temperature and relative humidity at the 4-1/2-foot height were used. Linear and nonlinear regression lines were fitted to these data. (Outside limits were determined to encompass the 95-percent level of confidence.) The linear regression was best suited for the 147 observed data points. This was determined by a "f" test run on the regression line and a "t" test on the "r" value. These values were highly significant at the 95-percent level. Figure 1 illustrates the regression curve. Outside limits are plotted to encompass the 95-percent level of confidence.

Figure 1.--Regression curve for moisture contents of cheatgrass.

A few additional samples were collected from cheatgrass which had been clipped and allowed to lie on the ground for several hours. These samples reached lower moisture content than the standing grass. Attachment to the root system must affect the moisture content of the standing grass.

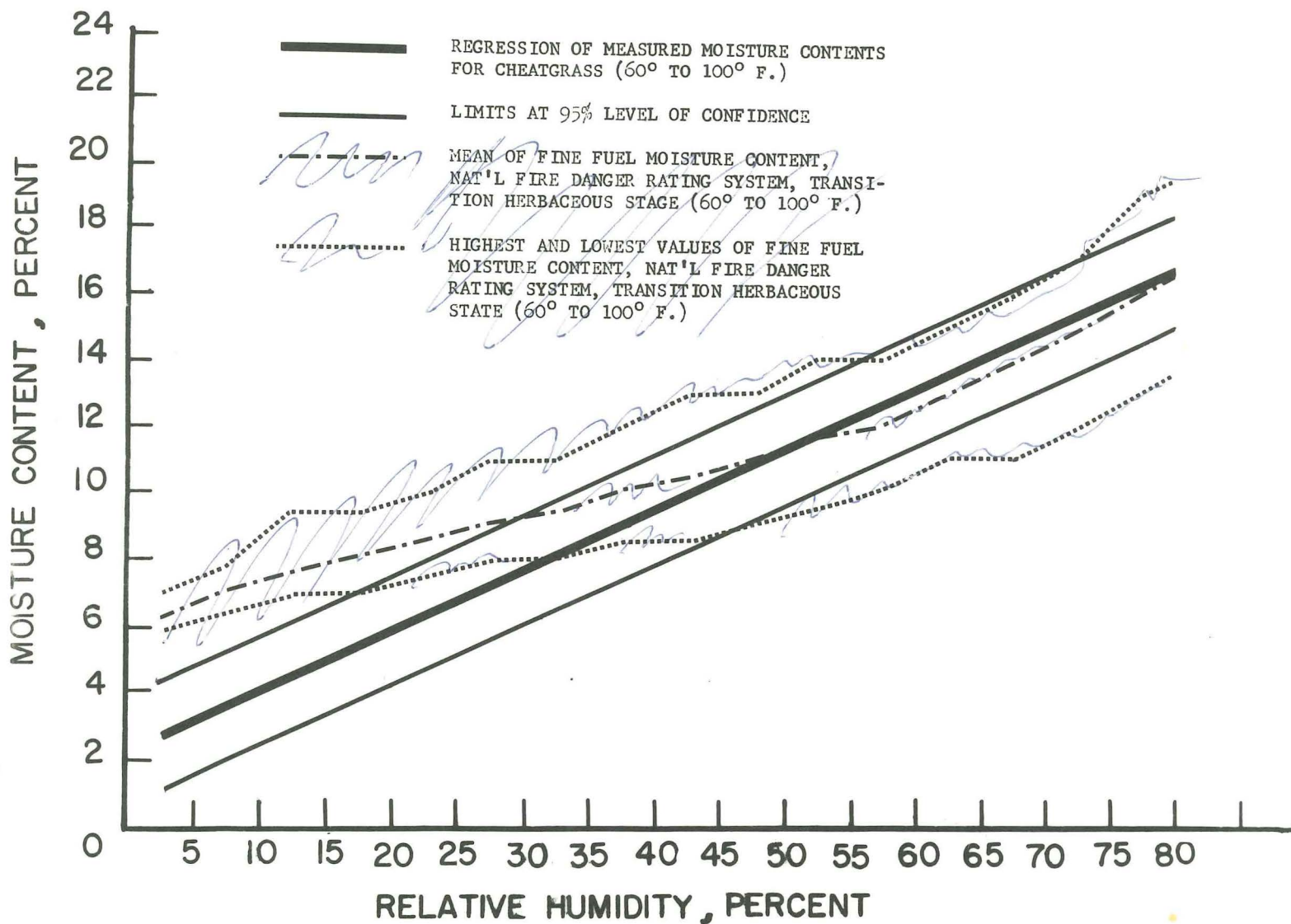


Figure 1.--Regression curve for moisture contents of cheatgrass.

Cheatgrass responds rapidly to changes in temperature and humidity. Response is consistent and lag effects are small.

Air temperature and relative humidity measurements are good criteria for estimating moisture content in cured cheatgrass stands.

The difference between air temperature and fuel temperature will vary by latitude and exposure to solar radiation, but within the Intermountain West one would expect estimated values to be reasonably close and useful for fire control operations.